

disturbed condition of the earth's normal magnetic state, and the effects are termed a magnetic storm. These storms coincide exactly in the recurrent periods of their occurrence with the times when the spots (as marking the existence of portentous solar convulsions) attain their maximum amount—the swings of the needle (as signs of the storm) being more frequent and more intense when the spots are copious, and less violent when the spots are few. The doctrine which has long been accepted is the recognition of a direct causal connection between these storms and extensive areas of spots. At such periods the currents of electricity traversing the earth's surface become so strong that communication by means of telegraph wires is rendered impracticable.

2. The displays of the Aurora Borealis (a phenomenon caused by electric discharges in rare air) invariably become more frequent, resplendent and general (appearing in both hemispheres) when the spots are numerous and large. As a matter of fact the magnetic storm accompanies the wider auroral manifestations. It has been shown that an almost perfect parallelism exists between the curves of auroral frequency, brilliancy and range, and those of spot abundance: the highest intensity of auroral phenomena exactly corresponding with the larger development of spots, and the period of sparseness or absence of spots synchronising precisely with the diminution in area and vividness of auroral appearances. It is an accepted doctrine that a direct connection exists between the condition of the sun (as indicated by the varying proportion of his spots) and this celestial phenomenon. It may be added that the influence of solar disturbances is propagated with the velocity of light.

3. It is needless to point out how vitally the material condition of the earth—its storms and consequent shipwrecks and marine insurance losses; its agricultural fertility or barrenness; its droughts and consequent famines, and the luxuriance or failure of its crops, are causally associated

with the state of its  
atmosphere, surface, and  
underground, as affected by these  
magnetic and electrical tempests. But I  
proceed to present a  
summary of specific statistics which have  
been collected.

4. Dr Meldrum, of the Observatory at  
Mauritius, has shown